

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 1-15, 17-21, 23-35, 37-47, 49-51, and 53-92 are presented for consideration.

Claims 1, 6-8, 20, 21, 26-28, 40, 49-51, 53-55, 56, 62, 64, 67, 87 and 90 are independent. Claim 22 has been canceled without prejudice or disclaimer of subject matter. Claims 14, 15, 21, 56, 64 and 69 have been amended to clarify features of the subject invention, while claims 81-92 have been added to recite additional features of the subject invention. Support for these changes can be found in the original application, as filed. Therefore, no new matter has been added.

Applicant notes with appreciation that claims 1-13, 17-20, 26-28, 40-47, 49-51, 53-55, 62, 63 and 71-80 have been allowed over the art of record. Applicant further submits that new claims 81-92 likewise should be deemed allowable at the outset for patentably defining additional features of the invention.

Applicant requests favorable reconsideration and withdrawal of the objection and rejections set forth in the above-noted Office Action.

Claims 14 and 15 were objected to for minor informalities. Claims 14 and 15 have been amended in view of the Examiner's comments to overcome these objections. Accordingly, this objection has become moot and should be withdrawn. Applicant requests such favorable indication.

Claims 21, 24, 29, 31-35, 37-39, 64 and 69 have been rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,341,006 to Murayama et al. Claim 30 has been rejected

under 35 U.S.C. § 103 as being unpatentable over the Murayama et al. patent in view of U.S. Patent No. 6,184,972 to Mizutani et al. Applicant submits that the cited art, whether taken individually or in combination, does not teach or suggest many features of the present invention, as recited in independent claims 21 and 64 as currently amended. With regard to the claims as currently amended, these rejections are respectfully traversed.

Independent Claim 21 as currently amended is directed to a gas replacement method in which a first gas is supplied into a chamber surrounding a predetermined space and a second gas, different from the first gas is supplied into the chamber after the first gas is supplied. The first and second gases contain substantially no oxygen. One of the first and second gases is supplied into the chamber by switching between a first gas supply unit that supplies the first gas and a second gas supply unit that supplies the second gas.

As currently amended, Claim 21 includes the limitation of cancelled Claim 22 that one of the first gas and the second gas is supplied into the chamber by switching between a first gas supply unit for supplying the first gas and a second gas supply unit for supplying the second gas. In view of the indication that Claim 22 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim, it is believed that Claim 21 as currently amended is allowable.

Independent Claim 64 as currently amended is directed to a gas replacement method in which a first gas is supplied to a chamber and a second gas different than the first gas is supplied into the chamber. The first gas has a higher molecular weight and the supply of the first gas

starts before the supply of the second gas. The first and second gases contain substantially no oxygen.

In Applicant's view, Murayama et al. discloses a projection exposure apparatus that projects a pattern image of an illuminated mask onto a substrate. The optical path can be divided into plural hermetic blocks each having an inert gas sealed therein by plural partition devices. A hermetic sealing member is disposed in the space between the substrate-side of the projection optical system and the substrate to replace the atmosphere existing in the optical path of the illuminating light in that space by a substance other than oxygen. Plural independent chambers are formed in a frame and lids, piping, and valves in the chambers are opened or closed in response to the value detected by oxygen density sensors.

According to the invention of Claim 64, a first gas supplied into a chamber has a higher molecular weight than a second different gas supplied into the chamber and the supply of the first gas is started before the supply of the second gas. The first and second gases contain substantially no oxygen. Advantageously, the supply of the higher molecular weight first gas before the supply of the second gas increases the efficiency of the substantially-no-oxygen gas replacement.

Murayama et al. discloses at lines 53-59 of column 16 that "Further, the main controller 8 can adjust the image formation characteristics of the projection optical system 12 by controlling the gas supply device 102 such that the pressure in the hermetic space 118a is changed, or an inert gas to be supplied is changed to another that has a different refractive index, or the mixture ratio of a plurality of inert gasses having different refractive indices is changed." As a result, the

Murayama et al. disclosure only considers the refractive indices of inert gases when one inert gas is changed to another but is devoid of any teaching or suggestion of a first supplied gas having a higher molecular weight than a second supplied inert gas and of starting supply of the higher molecular weight first gas before starting supply of the second supplied gas as in Claim 64. Accordingly, it is not seen that Murayama et al.'s changing one inert gas to another inert gas without any consideration of relative molecular weight in the sequence of supplying the gases could possibly teach or suggest the features of Claim 64 of starting supply of a first higher molecular weight gas into a chamber before starting supply of a second lower molecular weight gas into the chamber which substantially improves the efficiency of gas replacement. It is therefore believed that Claim 64 as currently amended is completely distinguished from Murayama et al. and is allowable.

Claims 56, 61, 64, 66 and 70 were rejected under 35 U.S.C. § 102 as being anticipated by PCT publication 00/31780 to Motegi et al. Applicant submits that the cited art, whether taken individually or in combination, does not teach or suggest many features of the present invention, as recited in independent claims 56 and 64 as currently amended. Therefore, this rejection is respectfully traversed.

Independent Claim 56 as currently amended is directed to exposure apparatus in which a first gas supply unit supplies a first gas into a chamber and a second gas supply unit supplies a second gas, different than the first gas, into the chamber. The first gas has a higher molecular weight than the second gas. The supply of the first gas into the chamber starts before the supply

of the second gas into the chamber starts and the first gas and the second gas contain substantially no oxygen.

In Applicant's opinion, Motegi et al. relates to apparatus in which an inert gas supply system and a dry air supply system are selectively connected to a first lens barrel and a second lens barrel of an exposure apparatus main body and a light source chamber of a laser apparatus. Oxygen sensors that measure the oxygen concentration and exhaust volume monitors that detect the exhaust volume of an exhaust duct are arranged in a chamber of the exposure apparatus main body and a chamber of the laser apparatus. When one of the detected oxygen concentration and the detected exhaust volume falls below a predetermined value, the purge gas supplied to the lens barrels and the light source chamber is switched from inert gas to dry air.

It is a feature of Claims 56 and 64 as currently amended that supply of a first higher molecular weight gas containing substantially no oxygen into a chamber is started before supply of a lower molecular weight gas containing substantially no oxygen into the chamber is started. Motegi et al. may teach supplying dry air from a supply unit 34 and supplying inert gas from a supply 32. The Motegi et al. disclosure, however, is devoid of any teaching or suggestion that both first and second gases contain substantially no oxygen and that, in supplying the gases, the supply of higher molecular weight first gas is started before the supply of the second gas starts. Accordingly, it is not seen that the switching between supply of an inert gas and supply of dry air into a chamber as in Motegi et al. could possibly teach or suggest the feature of Claims 56 and 64 of starting supply of a first gas containing substantially no oxygen and having a higher molecular weight than a second gas containing substantially no oxygen into a chamber before starting

supply of the second gas. It is therefore believed that Claims 56 and 64 as currently amended are completely distinguished from Motegi et al. and are allowable.

New independent Claim 87 is directed to exposure apparatus in which a first gas supply unit supplies a first gas into a chamber and a second gas supply unit supplies a second gas different than the first gas into the chamber. A switching mechanism switches between supply of the first gas from the first gas supply unit and supply of second gas from the second supply unit. The first gas has a higher molecular weight than the second gas. Supply of the first gas into the chamber starts before supply of the second gas into the chamber starts and the first gas and the second gas contain substantially no oxygen.

New independent Claim 90 is directed to a gas replacement method in which a first gas is supplied into a chamber surrounding a predetermined space. A second gas different from the first gas is supplied into the chamber after the first gas is supplied. The first and second gases contain substantially no oxygen and the first gas is heavier than the second gas.

As discussed with respect to Claims 21 and 64, Murayama et al. only considers refractive indices of first and second inert gases in a gas replacement arrangement but is devoid of any consideration of the relative molecular weight or heaviness of the gases or any requirement that supply of the higher molecular weight or heavier first gas containing substantially no oxygen into a chamber be started before the supply of the second gas containing substantially no oxygen into the chamber is started as in Claims 87 and 90. It is a further feature of Claim 87 that a switching mechanism switches between supply of the first gas and supply of the second gas. In contrast, Murayama et al. only teaches discharge switching and switching communication direction but

fails to suggest any switching mechanism that switches between first and second gas supplies. It is therefore believed that new Claims 87 and 90 are completely distinguished from Murayama et al. and are allowable.

Motegi et al., as discussed with respect to Claims 56 and 64, is restricted to disclosing supplying dry air from one supply unit and supplying an inert gas from another supply unit. The Motegi et al. disclosure, however, is directed away from the feature of Claim 87 of a switching mechanism that switches between supplying a higher molecular weight first gas that contains substantially no oxygen to a second gas that contains substantially no oxygen combined with the feature of starting supply the first gas before starting supply of the second gas and fails to suggest the supplying a heavier first gas containing substantially no oxygen into a chamber and then supplying a second different gas containing substantially no oxygen into the chamber after the first gas is supplied as in Claim 90. Accordingly, it is believed that new Claims 87 and 90 are completely distinguished from Motegi et al. and are allowable.

A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against independent Claims 21, 56, 64, 87 and 90 herein. Those claims are therefore believed patentable over the art of record.

The other rejected claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the

invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable consideration and reconsideration and early passage to issue of the present application.

Applicant's attorney, Steven E. Warner, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

  
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